Rockfish Tagging off Southwest Vancouver Island and off Northwest Washington, *M/V Sun Maiden*, May 3-17, 1982

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ROCKFISH TAGGING OFF SOUTHWEST VANCOUVER ISLAND AND OFF NORTHWEST WASHINGTON, M/V SUN MAIDEN, MAY 3-17, 1982

by

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ABSTRACT

Carter, E. W., D. A. Nagtegaal, and B. M. Leaman. 1982. Rockfish tagging off southwest Vancouver Island and off northwest Washington, M/V SUN MAIDEN, May 3-17, 1982. Can. Data Rep. Fish. Aquat. Sci. 349: iii + 51 p.

In May, 1982, the Pacific Biological Station conducted a yellowtail rockfish (Sebastes flavidus) tagging cruise as part of an ongoing tagging program. The purposes of this tagging were to further investigate rockfish migration, abundance, growth, and aid in validating present ageing techniques. A total of 3,272 S. flavidus were tagged and released after injection with oxytetracycline, at a dosage of 50 mg/kg of body weight. Tagging data, observations on pre- and post-tagging mortality, and records of injury and condition of the fish at time of release are presented in this report.

Key words: Rockfish, tagging, age determination, mortality.

RÉSUMÉ

Carter, E. W., D. A. Nagtegaal, and B. M. Leaman. 1982. Rockfish tagging off southwest Vancouver Island and off northwest Washington, M/V SUN MAIDEN, May 3-17, 1982. Can. Data Rep. Fish. Aquat. Sci. 349: iii + 51 p.

En mai 1982, le personnel de la Station de biologie du Pacifique a mené une expédition d'étiquetage du sébaste à queue jaune (Sebastes flavidus) dans le cadre du programme permanent d'étiquetage. Cet exercice avait pour but d'étudier plus à fond la migration, l'abondance et la croissance de cette espèce, ainsi que d'aider à valider la scalimétrie actuelle. Au total, 3 272 S. flavidus ont été étiquetés et relâchés après injection d'oxytétracycline à une dose de 50 mg par kg de poids. Le rapport présente les données d'étiquetage, les observations sur la mortalité avant et après l'étiquetage et les rapports sur les blessures et la condition du poisson au moment de la mise en liberté.

Mots-clés: sébaste, étiquetage, scalimétrie, mortalité

INTRODUCTION

This is the third report describing the rockfish tagging program off the west coast of Vancouver Island and in Queen Charlotte Sound. The program was initiated by the Pacific Biological Station to study the distribution, migration and growth of commercially important rockfishes, and to validate present ageing methods. Examination and development of tagging techniques specific to rockfish were completed during the initial cruise in 1980 (Shaw et al. 1981) and successfully implemented in all subsequent tagging studies.

This report summarizes the results of a second tagging cruise to the west coast of Vancouver Island and the northwest coast of Washington, conducted May 3-17, 1982. Tagging effort was concentrated at Cape Flattery Spit, but some rockfish were also tagged off San Juan and at Ollie Spot (Fig. 1, 2).

CRUISE PLAN

VESSEL AND GEAR

The M/V SUN MAIDEN, a 28.7 m (94 ft) stern trawler from Vancouver, was awarded the survey charter. A four-panel midwater trawl lined with a 3.2 cm (1.25 in) mesh codend liner was used throughout the survey. Complete vessel and gear specifications are contained in Appendix Tables 1 and 2, respectively.

Tows were made when fish were noted on the sounder recordings, and the duration of each tow varied with the amount of fish observed (with a net sounder) entering the net. Tows were generally limited to 30 minutes or less to minimize damage to fish, but tow time ranged from 5 to 90 minutes at speeds of 2.5 to 3.5 kn.

TAGGING EQUIPMENT AND PROCEDURE

The equipment and procedures used were similar to those described by Shaw et al. (1981). We employed two anaesthetic tanks and one recovery tank. The two anaesthetic tanks were 2,038 L (448 gal) and 780 L (172 gal), while the recovery tank was 2,467 L (543 gal). The anaesthetic (MS-222--ethyl-m-amino benzoate methane sulfonate) was administered at a working dosage of 1:80,000 by volume.

After the codend was emptied into a checker, fish were hand-transferred into the covered anaesthetic tank to a maximum capacity of approximately 200 fish in the larger tank. The smaller tank limit was set at 50-70 fish. Fish were then treated for barotrauma by deflating the swim bladder using a hypodermic syringe and applying gentle pressure to the abdomen (Shaw et al. 1981).

Fish were then passed in a shallow dipnet to one of the taggers, measured for fork length to the nearest centimetre, and tagged with a nylon anchor tag[1] using a Floy Mark II long tagging gun. All fish were injected with oxytetracycline (OTC), at a dosage of 50 mg/kg of body weight. This marks the actively growing periphery of the otolith and will assist in validating the present ageing technique (Shaw et al. 1981).

Following tagging, fish were immediately placed in the continuous-flow, covered recovery tank for a minimum of one hour. Under calm sea conditions, the fish from the last haul of the day were held overnight to allow a longer term assessment of their condition. All fish were individually released using a dipnet, and records were kept on their injury characteristics and condition at times of release. After release, the water in both the anaesthetic and recovery tanks was drained and the tanks refilled.

RESULTS

GENERAL

The yellowtail rockfish (Sebastes flavidus) was the target species and the only species tagged. Tagging was concentrated in three localities off southwest Vancouver Island and Washington. A total of 41 hauls were completed. These were distributed as follows: Cape Flattery Spit-26, Ollie Spot-7, San Juan-4, and Big Bank-4. The four hauls on the Big Bank produced no S. flavidus. Bridge log information and species catch by haul are contained in Appendix Table 3 and haul locations are shown on Fig. 1 and 2. Table 1 summarizes the total catch by species for the survey.

In addition to tagging, an age/maturity sample (n=144) of hake (Merluccius productus) was taken. These data are summarized in Table 2. A description of hake maturity conditions from Weir et al. (1978) is given in Table 3. A list of common and scientific names of all species encountered can be found in Appendix Table 4.

Inclement weather and high seas forced two harbour days early in the survey. Following these, much time was spent sounding the areas trying to relocate the fish. The final day of the survey was spent near San Juan where fishing success was good.

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[1]FD68BC Anchor. Floy Manufacturing Co., Seattle, Wa 98105.

TAGGING

A total of 3,272 S. flavidus were tagged, injected and released. The number released by area were: Cape Flattery Spit-2,426, Ollie Spot-294, and San Juan-552. Table 4 presents the length frequency of tagged S. flavidus, by haul. These data are summarized by area (Fig. 3) and as a combined total (Fig. 4). Size range of fish varied between areas with ranges of 28-53 cm at San Juan (mode=39 cm), 36-55 cm at Ollie Spot (mode=45 cm), and 31-56 cm at Cape Flattery Spit (mode=44 cm). A summary of tag numbers used and numbers of fish released by area is given in Table 5.

Mortality of S. flavidus was recorded as pre-tagging and post-tagging (Types I and II) mortality as defined by Leaman et al. (1979). In comparison with previous rockfish tagging surveys (Shaw et al. 1981; Nagtegaal et al. 1982), the percent Type I mortalities for S. flavidus in southwest Vancouver Island were quite close (1980-1.4%, 1982-1.2%) but were higher in Queen Charlotte Sound (1980-10.8%, 1981-1.5%). The Type II mortalities were much lower in 1982 regardless of area (SWVI; 1980-4.3%, 1982-0.4%, Q.C.S.; 1980-5.0%, 1981-1.5%). The type II mortality percentage for 1982 was calculated from only four hauls kept overnight, however, which might account for the lower value. Pre- and post-tagging mortality summaries are presented in Tables 6 and 7, respectively. In addition to mortality, records of condition (Table 8) and injury (Table 9) at time of release were also kept. The most frequently occurring injury was scale loss as was the case with all the previous rockfish tagging cruises.

ACKNOWLEDGMENTS

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Table 1. Total catch by species during M/V SUN MAIDEN rockfish tagging cruise, May 3-17, 1982.

Species	Weight (kg)	Percent
Sebastes flavidus	7,175	39.16
Theragra chalcogramma	2,881	15.73
Merluccius productus	2,863	15.63
S. proriger	2,676	14.61
S. entomelas	876	4.78
S. pinniger	786	4.29
Clupea harengus pallasi	484	2.64
Squalus acanthias	431	2.35
Gadus macrocephalus	122	0.67
Sebastes paucispinis	22	0.12
Trace[a]	5	0.03
Total	18,321	100.01

[a]Includes species which represented <1% of the total catch.

Table 2. Hake maturity sample collected on M/V SUN MAIDEN, May 3-17, 1982.

SPECIES: Pacific hake
LOCALITY: Ollie Spot
DATE: May 14, 1982
HAUL: 34
DEPTH (m): 60-101
(footrope)

	MALE						FEMALE					
CONDITION	I-1	R-1	R.R.	S	Rest.		I-1	R-1	R.R.	S	Rest.	
LENGTH (cm)												
45	-	1			-			-			-	
46	-	0			1			1			-	
47	2	0			3			2			1	
48	-	0			2			0			2	
49	-	0			0			1			4	
50	-	0			5			1			1	
51	-	0			2			1			10	
52	-	1			1			2			11	
53	-	-			2			2			11	
54	-	-			2			0			12	
55	-	-			4			0			8	
56	-	-			1			1			15	
57	-	-			3			-			9	
58								-			2	
59								-			5	
60								-			3	
61								-			1	
62								-			1	
63								-			3	
64								-			1	
65								-			0	
66								-			2	
67								-			0	
68								-			1	
69												
70												
SUB TOTAL	2	2			26			11			103	
% MATURITY												
TOTAL			30						114			
SEX RATIO			20.8						79.2			

Table 3. Pacific hake--maturity states.

	Female	Male
Immature 1 I-1	Virgin, ovary small, light pink and semi-transparent, no ova.	Virgin, testes small, no convolutions.
Immature 2 I-2	Virgin, ovary still small, light pink and semi-transparent, some ova, but without yolk.	Virgin, testes small and pink but convoluted.
Ripening 1 R-1	Ovary small but starting to enlarge, fills about 1/4 body cavity, light yellow ova with yolk and opaque, blood vessels on ovary pronounced.	Testes about 1/4 body cavity and convoluted, contain small amount of milt, convolutions firm and pink.
Ripening 2 R-2	Ovary larger, filling more than 1/3 the body cavity, yellow. Ova with yolk and opaque, blood vessels on ovary pronounced.	Testes about 1/2 body cavity, convoluted, loose and about 2/3 full of milt, edge of convolutions pink and firm.
Ripe R	Ovary translucent, yellow: 1/2 to 2/3 the body cavity, yellow ova opaque or translucent.	Testes large, convoluted and full of milt, fill about 2/3 of body cavity, some milt may flow from vent with pressure.
1 Ripe 1R	Ovary large, fills 1/2 to 2/3 body cavity, less than 1/2 the ova are translucent.	No stage in males.
2 Ripe 2R	Ovary large, fills 2/3 the body cavity, more than 1/2 the ova are translucent.	No stage in males.
Running ripe R.R.	Translucent ova flow from vent with slight pressure, ovaries almost fill body cavity, ova opaque or translucent, ova loose in ovary. Ovary translucent.	Testes large, milt flows from vent with slight pressure, edge of testes may be blood-shot in fresh specimens.

Table 3 (cont'd)

	Female	Male
Spent S	Ovary bloodshot, purple in colour, some ova may remain translucent. Ovary flaccid about 1/3 body cavity.	Testes bloodshot and flaccid, may contain some milt, now reduced to less than 1/2 body cavity.
Resorbing Resb.	Fish has not spawned, ovaries large, about 1/2 body cavity, soft and flaccid; ova are large and watery.	No stage in males.
Recovering Rec.	Ovaries returning to pre-ripening size, less than 1/2 body cavity, not flaccid, moderately firm. Ova small, no bloodshot appearance.	Testes moderately firm, little milt, and loose convolutions.
Resting Rest.	Ovaries small, less than 1/4 body cavity, moderately firm, bloodshot appearance gone, white sheen to external ovary surface.	Testes small, firm and pink, may be some milt, with convolutions, less than 1/4 body cavity.

Table 4. Length frequency of tagged S. flavidus, M/V SUN MAIDEN, May 3-17, 1982.

Fork length (cm)	Set number										
	2	3	5	12	13	14	15	16	17	18	19
25	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	2	-	-	-	-	-	-
33	-	1	-	-	6	-	-	1	-	-	-
34	-	0	-	-	2	-	-	1	-	-	-
35	-	1	-	2	6	-	3	1	-	-	-
36	3	0	1	2	8	1	1	3	-	-	-
37	5	6	2	3	9	0	3	7	-	-	2
38	3	2	4	5	12	1	6	5	-	-	2
39	6	12	2	8	13	1	3	5	-	2	2
40	12	11	2	16	10	5	7	11	-	4	4
41	13	11	1	17	6	6	10	23	-	2	4
42	14	11	4	10	14	1	7	20	-	8	7
43	14	16	1	15	9	2	6	30	-	10	13
44	16	14	4	15	8	0	12	25	-	11	8
45	17	11	3	9	3	1	1	20	-	14	28
46	12	11	1	8	4	1	9	12	-	18	22
47	9	19	1	7	3	0	1	13	2	22	18
48	4	10	1	7	5	2	5	6	0	22	31
49	8	6	1	8	0	0	1	3	0	20	21
50	1	3	-	0	1	0	0	3	0	11	9
51	1	2	-	2	0	1	1	2	0	15	10
52	-	2	-	2	1	-	-	0	0	1	6
53	-	3	-	1	-	-	-	0	1	7	5
54	-	-	-	-	-	-	-	1	1	2	7
55	-	-	-	-	-	-	-	-	-	2	2
56	-	-	-	-	-	-	-	-	-	1	1
57	-	-	-	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-	-	-
Total	138	152	28	137	122	22	76	192	4	172	202

Table 4 (cont'd)

Fork length (cm)	Set number									
	20	21	22	23	25	26	28	30	31	32
25	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-
31	-	1	1	-	-	-	1	-	-	-
32	-	0	0	-	-	-	0	-	-	-
33	-	0	0	-	-	-	1	-	-	-
34	-	1	0	-	1	-	0	-	-	-
35	-	2	1	1	1	-	4	-	-	-
36	2	5	2	1	0	1	8	-	2	-
37	1	4	1	5	4	1	4	-	2	-
38	2	13	3	9	9	2	14	-	5	-
39	2	20	1	10	5	5	5	-	7	3
40	6	22	4	8	12	2	21	-	9	2
41	11	9	5	10	16	5	26	-	13	2
42	8	27	7	15	16	13	26	-	21	7
43	7	19	7	9	15	13	15	1	19	9
44	9	32	4	20	17	9	13	0	22	6
45	15	21	2	22	20	19	7	2	21	13
46	17	19	0	12	20	12	10	1	15	6
47	31	16	1	10	16	10	11	0	15	10
48	16	10	0	24	14	8	10	1	11	3
49	25	10	0	7	8	6	3	3	8	4
50	17	5	1	6	8	1	2	1	7	3
51	7	4	1	2	1	0	-	1	3	1
52	11	2	-	0	3	1	-	0	-	1
53	8	-	-	2	0	2	-	0	-	1
54	6	-	-	0	3	-	-	1	-	1
55	1	-	-	0	-	-	-	-	-	1
56	-	-	-	1	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-	-
Total	202	242	41	174	189	110	181	11	181	73

Table 4 (cont'd)

Fork length (cm)	Set number							
	33	36	37	38	39	40	41	Total
25	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
28	-	-	-	-	-	1	-	1
29	-	-	-	2	-	0	-	2
30	-	-	-	4	-	1	-	5
31	-	-	-	5	-	0	-	8
32	-	-	-	3	-	2	1	8
33	-	-	-	12	-	5	2	28
34	-	-	-	10	-	3	3	21
35	-	-	-	11	1	6	12	52
36	-	-	-	14	0	6	15	75
37	-	1	-	18	0	3	23	104
38	1	2	-	13	1	12	28	154
39	0	0	-	22	1	10	34	179
40	0	2	-	12	0	11	32	225
41	2	3	-	13	0	8	22	238
42	4	1	-	14	0	10	21	286
43	1	3	-	5	0	2	15	256
44	0	6	-	4	1	2	9	268
45	3	0	1	3	0	2	7	265
46	3	3	0	3	0	2	6	227
47	3	5	0	5	0	2	2	232
48	2	7	2	12	0	9	2	224
49	0	2	2	2	4	7	1	160
50	1	3	1	3	3	4	0	94
51	2	2	-	0	-	3	1	62
52	1	1	-	2	-	-	0	34
53	-	0	-	1	-	-	1	32
54	-	1	-	-	-	-	-	23
55	-	-	-	-	-	-	-	6
56	-	-	-	-	-	-	-	3
57	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-
Total	23	42	6	193	11	111	237	3,272

Table 5. Summary of tag identification numbers released for S. flavidus by locality, M/V SUN MAIDEN, May 3-17, 1982.

Locality	Tag identification no.	No. released
Cape Flattery Spit	R120375-R122897 R122900-R122906 R123183-R123185 R123222-R123286	2,426
Ollie Spot	R122898-R122899 R122907-R123182 R123186-R123191 R123200-R123221	294
San Juan	R123192-R123199 R123269-R123863 R123875-R123876	552
Total		3,272

Table 6. Pre-tagging mortalities for S. flavidus by locality, M/V SUN MAIDEN, May 3-17, 1982.

Locality	Haul no.	No. tagged	Pre-tagging mortalities	
			No.	%
Cape Flattery Spit	2	138	0	-
	3	152	0	-
	5	28	0	-
	12	137	1	0.1
	13	122	3	2.5
	14	22	0	-
	15	76	0	-
	16	192	5	2.6
	17	4	0	-
	18	172	3	1.7
	19	202	6	3.0
	20	202	4	2.0
	21	242	7	3.0
	22	41	0	-
	23	174	4	2.3
	25	189	6	3.2
	26	110	2	1.8
	28	181	1	0.6
	36	42	0	-
Sub-total		2,426	42	1.7
Ollie Spot	30	11	0	-
	31	180	1	0.6
	32	73	1	1.4
	33	23	1	4.3
	37	6	0	-
Sub-total		294	3	1.0
San Juan	38	193	9	4.7
	39	11	0	-
	40	111	2	1.8
	41	237	31	13.1
Sub-total		552	42	7.6
Total		3,272	87	2.7

Table 7. Post-tagging (Types I and II) mortality[a] of S. flavidus by haul and locality, M/V SUN MAIDEN, May 3-17, 1982.

Locality	Haul no.	No. tagged	Type I mortality		Type II mortality		Sinkers		Floaters		Total[b]	
			no.	%	no.	%	no.	%	no.	%	no.	%
Cape Flattery Spit	2	138	0	-	0	-	1	0.7	4	2.9	5	3.6
	3	152	0	-	6	3.9	12	7.9	2	1.3	20	13.2
	5	28	0	-	0	-	0	-	1	3.6	1	3.6
	12	137	3	2.2	0	-	2	1.5	7	5.1	12	8.8
	13	122	2	1.6	0	-	2	1.6	5	4.1	9	7.4
	14	22	0	-	0	-	2	9.1	1	4.6	3	13.6
	15	76	0	-	0	-	0	-	5	6.6	5	6.6
	16	192	1	0.5	0	-	2	1.0	14	7.3	17	8.9
	17	4	0	-	0	-	0	-	0	-	0	-
	18	172	0	-	0	-	0	-	3	1.7	3	1.7
	19	202	1	0.5	0	-	3	1.5	3	1.5	7	3.5
	20	202	0	-	4	2.0	2	1.0	15	7.4	21	10.4
	21	242	2	0.8	0	-	1	0.4	7	2.9	10	4.1
	22	41	2	4.9	0	-	0	-	0	-	2	4.9
	23	174	3	1.7	0	-	0	-	3	1.7	6	3.4
	25	189	0	-	2	1.1	2	1.1	1	0.5	5	2.6
	26	110	0	-	0	-	0	-	3	2.7	3	2.7
	28	181	4	2.2	0	-	1	0.6	2	1.1	7	3.9
	36	42	0	-	0	-	2	4.8	0	-	2	4.8
Sub-total		2,426	18	0.7	12	0.5	32	1.3	76	3.1	138	5.7
Ollie Spot	30	11	0	-	0	-	0	-	0	-	0	-
	31	181	4	2.2	0	-	0	-	7	3.9	11	6.1
	32	73	0	-	0	-	1	1.4	0	-	1	1.4
	33	23	2	8.7	0	-	0	-	0	-	2	8.7
	37	6	0	-	0	-	0	-	0	-	0	-
Sub-total		294	6	2.0	0	-	1	0.3	7	2.4	14	4.8
San Juan	38	193	1	0.5	0	-	2	1.0	4	2.1	7	3.6
	39	11	0	-	0	-	0	-	0	-	0	-
	40	111	8	7.2	0	-	4	3.6	5	4.5	17	15.3
	41	237	8	3.4	0	-	6	2.5	10	4.2	24	10.1
Sub-total		552	17	3.1	0	-	12	2.2	19	3.4	48	8.7
Grand total		3,272	41	1.3	12	0.4	45	1.4	102	3.1	200	6.1

[a]Type I mortality: Died within approximately one hour after tagging.
Type II mortality: Died overnight.
[b]Total: Sum of "Types I and II mortalities", "sinkers", and "floaters".

Table 8. Summary of S. flavidus conditions at time of release, M/V SUN MAIDEN, May 3-17, 1982.

Condition	Cape Flattery Spit	Ollie Spot	San Juan
1 - weak	219	16	44
2 - good	1,420	185	243
3 - sinker	33	1	12
4 - floater	76	7	19
9 - fate unknown	39	4	6
Total	1,787	213	324

Table 9. Summary of S. flavidus injuries at time of release by locality, M/V SUN MAIDEN, May 3-17, 1982.

Injury	Cape Flattery Spit	Ollie Spot	San Juan
A - bleeding at tag hole	42	8	2
B - general bleeding	0	0	0
C - cut, lesion, or open wound	47	6	7
D - dropped on deck	5	3	1
E - eyes cloudy or damaged	19	3	12
F - general fin damage	0	0	0
G - gas	0	0	0
H - bleeding at gas hole	33	3	7
J - jaw bleeding or damaged	3	3	0
K - dorsal fin damage	86	7	12
L - scale loss	317	22	164
N - abrasions,scrapes, bruises	150	12	24
O - bleeding at OTC hole	27	2	5
P - pectoral fin damage	3	1	0
Q - anal fin damage	0	0	0
R - raw wound at tag	13	5	0
S - scar or healing wound	4	4	2
T - caudal fin damage	3	1	0
U - pelvic fin damage	0	0	0
Multiple injuries	104	12	42
No injuries	1,570	202	245
Total	2,426	294	552

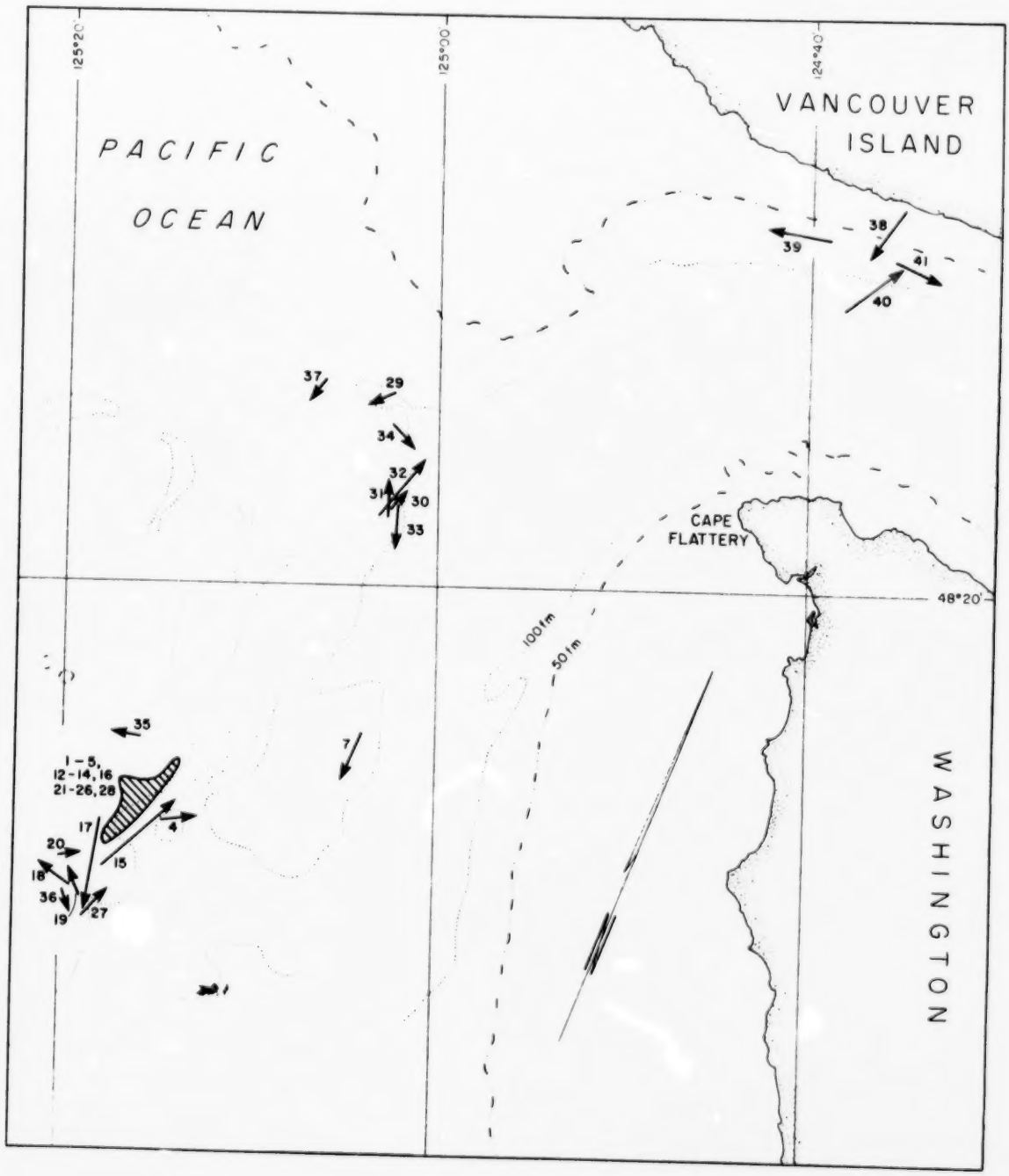


Fig. 1. Haul locations of M/V SUN MAIDEN during the rockfish tagging cruise, May 3-17, 1982.

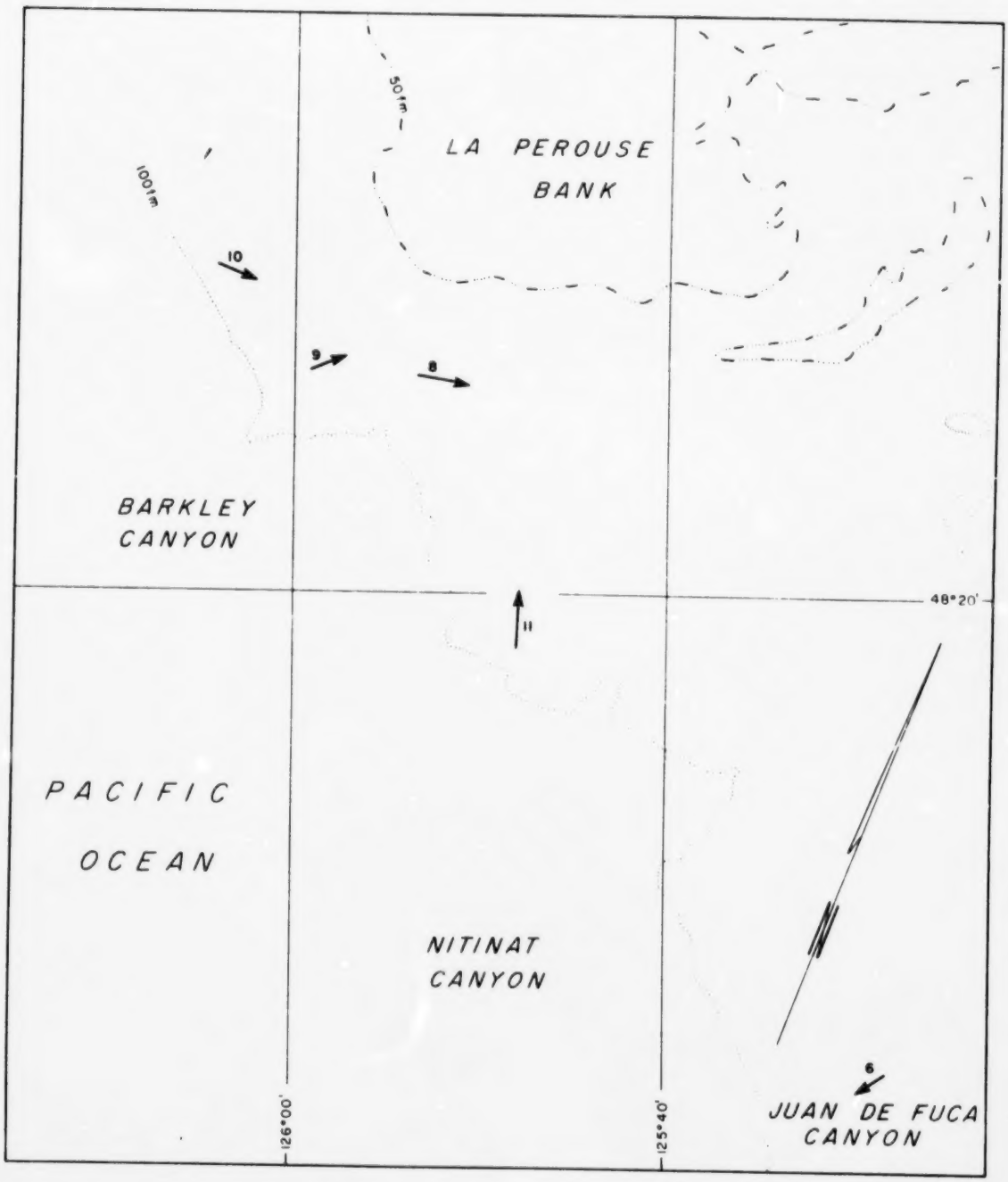


Fig. 2. Haul locations of M/V SUN MAIDEN during the rockfish tagging cruise, May 3-17, 1982.

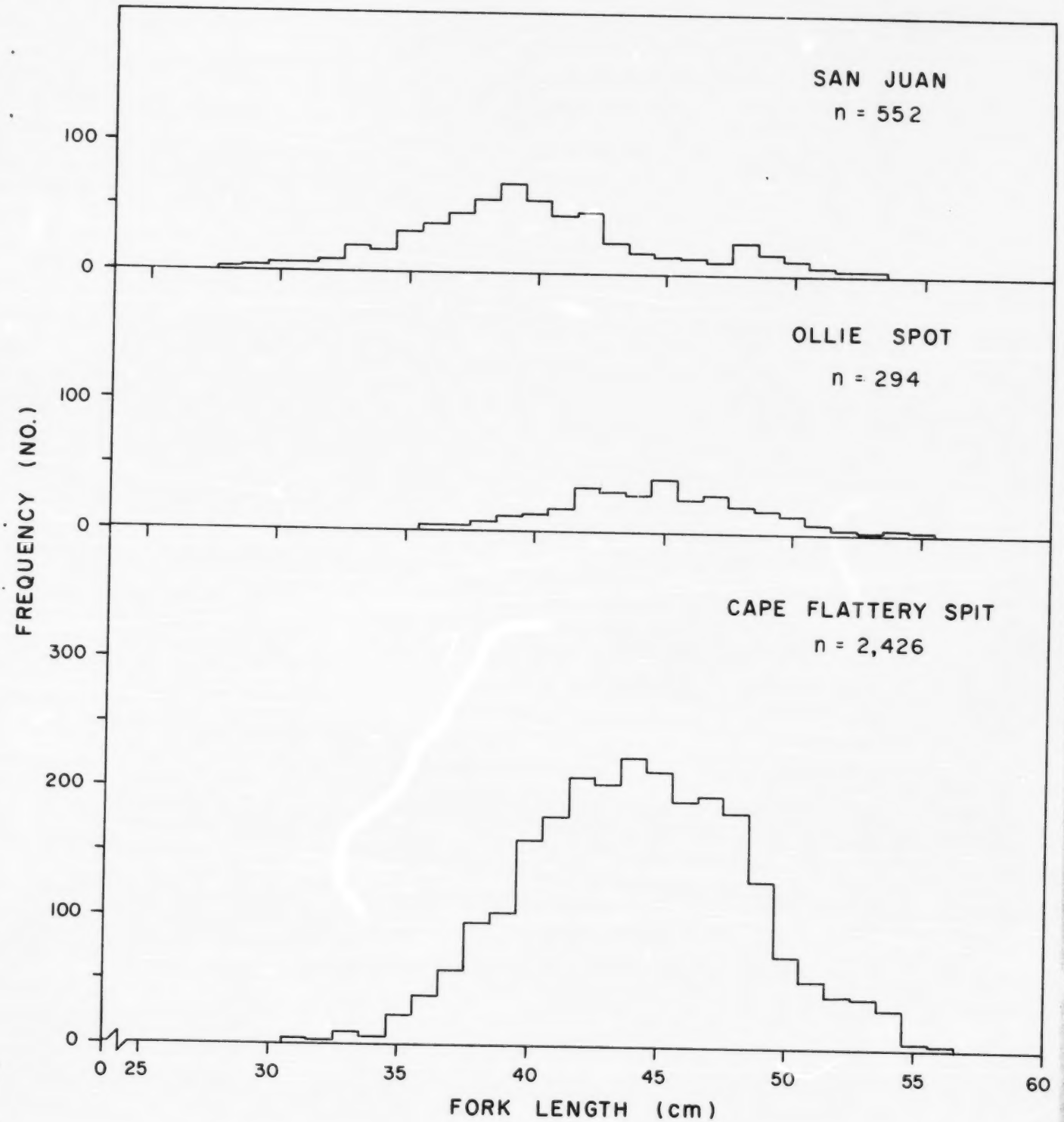


Fig. 3. Size composition of tagged rockfish, M/V SUN MAIDEN, May 3-17, 1982.

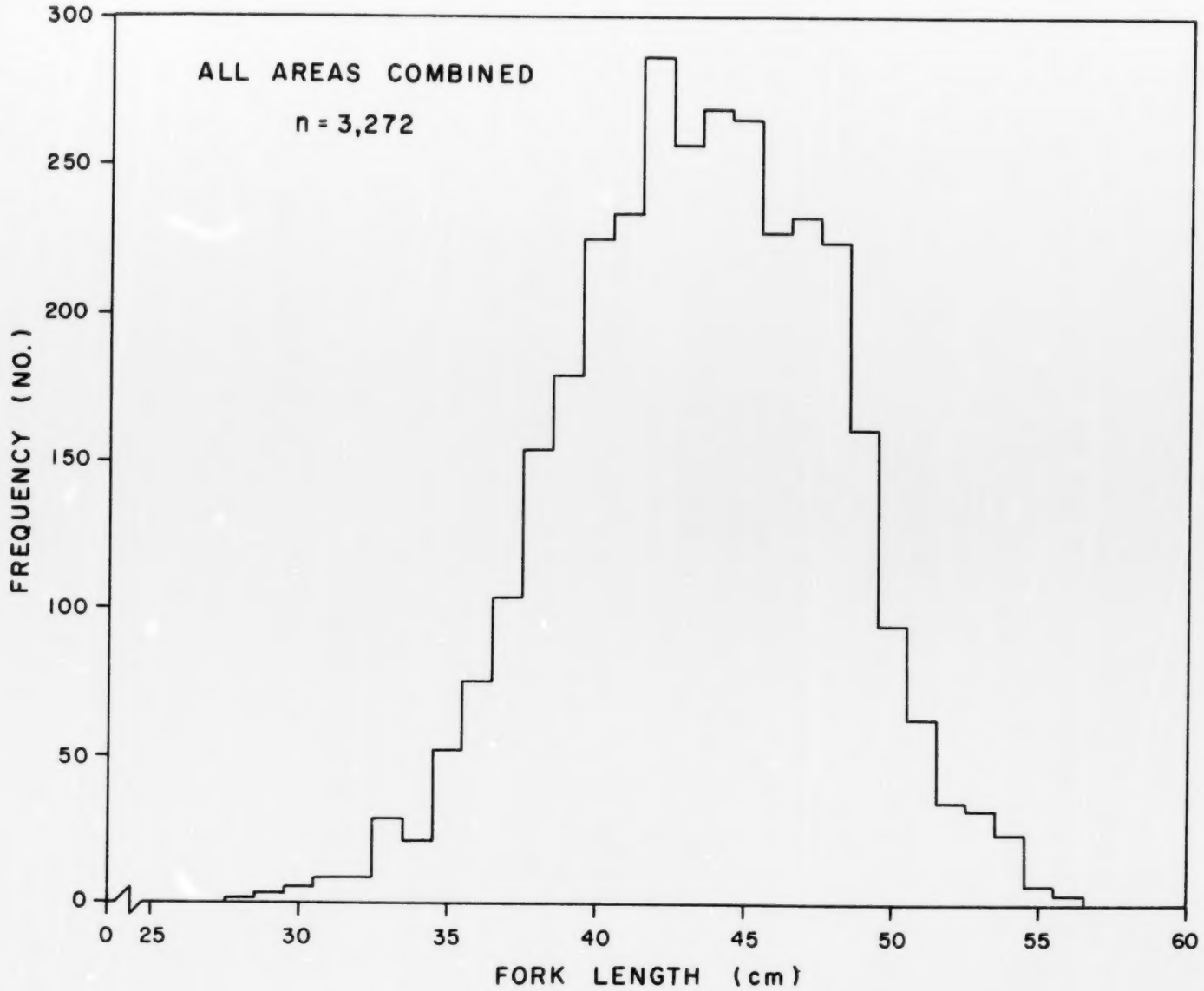


Fig. 4. Size composition of tagged rockfish, M/V SUN MAIDEN, May 3-17, 1982.

Appendix Table 1. Vessel specifications.

Vessel name:	SUN MAIDEN
Skipper:	Frank J. Gale
Landing port:	Vancouver
Gross tonnage:	147
Overall length:	28.7 m (94 ft)
Horsepower:	565
Crew (total):	4
Fish storage:	Refrigerated seawater

Electronic Aids

Sounder:	Kelvin Hughes
Sonar:	Furuno
Radar:	1 Decca 48, 1 Furuno 72
Radio:	1 SSB, 2 VHF
Autopilot:	Decca
Loran:	Northstar 6000, Furuno FC 200
Sounder (Net):	Furuno 400 Mk II

Trawl Gear

	Double gear
Winches:	two singles

Cable

Amount per single spool:	
Length:	1,280 m (700 fm)
Diameter:	1.9 cm (0.75 in)

Net Reel

Double trawl hydraulic

Appendix Table 2.

NET DIMENSIONS AND CHARACTERISTICS FOR MIDWATER TRAWL

VESSEL NAME SUN MAIDEN VESSEL TYPE Stern trawler OBSERVATION PERIOD 3-17 May 1982

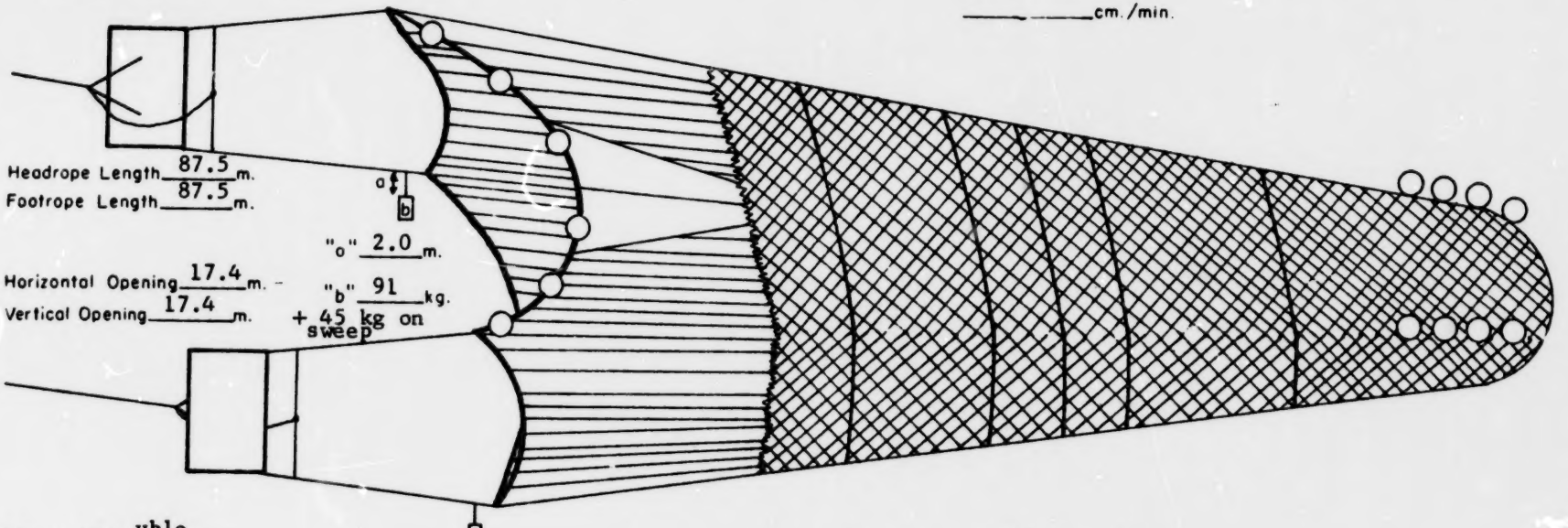
TRAWL DOORS
Shape Rectangular
Type Suberkrub
Dimensions 3.04 m x 1.53 m.
Weight 227 kg.

SWEEPLINE / DANDYLINE
Length 91 m.

FLOATS
Number -
Size ____ cm.
Shape ____
Material ____

FISH FINDER
Name ____
Model No ____
Frequency ____ kc.
Paper Type (wet or dry)
Speed of Advance
____ cm./min.

NET RECORDER
Name FURUNO
Model No 400 Mk II
Frequency 60 kc.



- 07 -

Length	m.	40.2 m.	45.7 m.	15.2 m.	30.4 m.	3.0 m.
MESH SIZE	____ cm.	91.4 cm.	61 cm.	30 cm.	15 cm.	8 cm.	7.6 cm.

WINGS
(mesh or line)
Mesh Size 91.4 cm.
Line Spacing - cm.
Line Thickness - cm.
Material poly
Height of Wings 87.5 m.

Mesh Material
poly

CODEND
(floats or weights)
Number -
Size ____ cm.
Weight ____ kg.
Material ____
Shape ____

APPENDIX TABLE 3. ROCKFISH TAGGING CRUISE, M/V SUNMAIDEN, SOUTHWEST COAST OF VANCOUVER IS., MAY 3-17, 1982

HAUL NUMBER		1	2	3	4
DATE		MAY 4	MAY 4	MAY 4	MAY 5
AREA (MAJOR, MINOR)		3C,21	3C,21	3C,21	3C,21
START TIME	(PDT)	13:04	14:00	17:45	8:19
DURATION	(MIN)	16	18	60	23
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	12.2	12.2	12.5	11.6
W. LONG	(DEG)	125	125	125	125
	(MIN)	16.7	15.8	15.3	14.8
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	12.3	12.0	12.4	11.7
W. LONG	(DEG)	125	125	125	125
	(MIN)	15.5	16.5	15.4	13.5
HAUL DISTANCE (N MI)		0.8	0.5	3.5	0.9
DIRECTION (DEG.TRUE)		50	270	225	56
BOTTOM DEPTH	(M)	150- 132	128- 201	128- 128	132- 256
	(FM)	82- 72	70- 110	70- 70	72- 140
NET/GEAR DEPTH	(M)	117- 106	119- 128	110- 102	97- 128
	(FM)	64- 58	65- 70	60- 56	53- 70
FOOTROPE-BOTTOM DISTANCE	(M)	101- 9	0- 0	18- 9	113- 128
	(FM)	55- 5	0- 0	10- 5	62- 70
WATER TEMP.	(DEG C)	10.0	10.0	10.0	10.0
GEAR TYPE		200	200	200	200
TIDE		EBB	EBB	EBB	FLOOD
TOTAL CATCH	(KG)	0	1362	544	907
REMARKS		USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	1	2	3	4
DATE	MAY 4	MAY 4	MAY 4	MAY 5
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	T	82	..
S. FLAVIDUS	..	454	435	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	454	27	..
S. PRORIGER	..	454	..	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	907
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	0	1362	544	907

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER		5	6	7	8
DATE		MAY 5	MAY 5	MAY 5	MAY 6
AREA (MAJOR, MINOR)		3C,21	3C,21	3C,21	3C,23
START TIME	(PDT)	9:52	14:26	17:45	11:45
DURATION	(MIN)	23	24	30	28
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	13.8	03.4	14.8	27.5
W. LONG	(DEG)	125	125	125	125
	(MIN)	13.8	28.2	04.0	53.4
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	12.9	03.0	13.6	27.3
W. LONG	(DEG)	125	125	125	125
	(MIN)	14.6	29.1	04.8	51.4
HAUL DISTANCE (N MI)		1.0	0.7	1.3	1.3
DIRECTION (DEG.TRUE)		120	185	195	90
BOTTOM DEPTH	(M)	128- 152	134- 139	121- 117	146- 130
	(FM)	70- 83	73- 76	66- 64	80- 71
NET/GEAR DEPTH	(M)	66- 124	99- 123	84- 97	53- 102
	(FM)	36- 68	54- 67	46- 53	29- 56
FOOTROPE-BOTTOM DISTANCE	(M)	82- 9	18- 2	18- 4	37- 11
	(FM)	45- 5	10- 1	10- 2	20- 6
WATER TEMP.	(DEG C)	10.0	10.0	10.0	10.0
GEAR TYPE		200	200	200	200
TIDE		FLOOD	EBB	FLOOD	SLACK
TOTAL CATCH	(KG)	30	5	226	453
REMARKS		USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	5	6	7	8
DATE	MAY 5	MAY 5	MAY 5	MAY 6
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,23
FLATFISH	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	30	..	..	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	..	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	226	226
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	..
PACIFIC SALMON	..	5	..	T
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	227
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	30	5	226	453

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER		9	10	11	12
DATE		MAY 6	MAY 6	MAY 6	MAY 9
AREA (MAJOR, MINOR)		3C,23	3C,23	3C,23	3C,21
START TIME	(PDT)	13:30	15:45	21:48	7:30
DURATION	(MIN)	43	27	14	70
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	27.7	31.3	19.1	11.0
W. LONG	(DEG)	125	126	125	125
	(MIN)	59.2	04.2	48.1	17.8
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	28.0	30.9	19.7	12.5
W. LONG	(DEG)	125	126	125	125
	(MIN)	58.0	02.8	48.0	15.0
HAUL DISTANCE (N MI)		0.9	1.0	0.6	2.4
DIRECTION (DEG.TRUE)		110	115	340	50
BOTTOM DEPTH	(M)	161- 152	165- 154	172- 165	183- 183
	(FM)	88- 83	90- 84	94- 90	100- 100
NET/GEAR DEPTH	(M)	126- 132	145- 134	119- 134	93- 130
	(FM)	69- 72	79- 73	65- 73	51- 71
FOOTROPE-BOTTOM DISTANCE	(M)	18- 4	18- 4	37- 15	73- 37
	(FM)	10- 2	10- 2	20- 8	40- 20
WATER TEMP. (DEG C)		10.0	10.0	10.0	9.5
GEAR TYPE		200	200	200	200
TIDE		FLOOD	FLOOD	FLOOD	EBB
TOTAL CATCH	(KG)	680	226	145	454
REMARKS		USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	9	10	11	12
DATE	MAY 6	MAY 6	MAY 6	MAY 9
AREA (MAJOR, MINOR)	3C,23	3C,23	3C,23	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	T	..	..	408
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	23
S. PRORIGER	544	135	136	23
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	23	9	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	136	68	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	680	226	145	454

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	13	14	15	16
DATE	MAY 9	MAY 9	MAY 9	MAY 9
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
START TIME (PDT)	11:50	14:54	16:44	21:50
DURATION (MIN)	5	16	41	5
START N. LAT. (DEG)	48	48	48	48
(MIN)	12.2	12.3	10.0	12.2
W. LONG (DEG)	125	125	125	125
(MIN)	15.9	15.4	17.8	15.5
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	12.1	10.7	12.1	12.0
W. LONG (DEG)	125	125	125	125
(MIN)	16.3	17.8	14.3	15.7
HAUL DISTANCE (N MI)	0.3	2.3	3.1	0.2
DIRECTION (DEG.TRUE)	230	130	280	220
BOTTOM DEPTH (M)	201- 220	165- 188	128- 238	201- 238
(FM)	110- 120	90- 103	70- 130	110- 130
NET/GEAR DEPTH (M)	112- 130	112- 135	93- 148	112- 148
(FM)	61- 71	61- 74	51- 81	61- 81
FOOTROPE-BOTTOM (M)	73- 73	37- 37	18- 73	73- 73
DISTANCE (FM)	40- 40	20- 20	10- 40	40- 40
WATER TEMP. (DEG C)	10.0	10.0	10.0	10.0
GEAR TYPE	200	200	200	200
TIDE	FLOOD	SLACK	EBB	FLOOD
TOTAL CATCH (KG)	136	25	136	907
REMARKS	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	13	14	15	16
DATE	MAY 9	MAY 9	MAY 9	MAY 9
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	..	41	136
S. FLAVIDUS	136	25	68	726
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	T	45
S. PRORIGER	..	..	27	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	136	25	136	907

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	17	18	19	20
DATE	MAY 10	MAY 10	MAY 10	MAY 10
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
START TIME (PDT)	6:35	8:45	14:44	19:25
DURATION (MIN)	85	30	14	47
START N. LAT. (DEG)	48	48	48	48
(MIN)	11.5	09.2	08.9	10.3
W. LONG (DEG)	125	125	125	125
(MIN)	18.1	19.4	19.1	20.0
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	08.2	09.7	09.4	10.4
W. LONG (DEG)	125	125	125	125
(MIN)	18.8	20.6	19.5	19.6
HAUL DISTANCE (N MI)	3.3	0.9	0.6	0.3
DIRECTION (DEG.TRUE)	210	330	300	190
BOTTOM DEPTH (M)	128- 201	155- 115	168- 194	117- 187
(FM)	70- 110	85- 63	92- 106	64- 102
NET/GEAR DEPTH (M)	57- 130	99- 93	130- 152	82- 148
(FM)	31- 71	54- 51	71- 83	45- 81
FOOTROPE-BOTTOM DISTANCE (M)	55- 55	37- 6	22- 26	18- 22
(FM)	30- 30	20- 3	12- 14	10- 12
WATER TEMP. (DEG C)	10.0	10.0	-	-
GEAR TYPE	200	200	200	200
TIDE	EBB	FLOOD	FLOOD	EBB
TOTAL CATCH (KG)	5	680	678	906
REMARKS	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	17	18	19	20
DATE	MAY 10	MAY 10	MAY 10	MAY 10
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	68	..	453
S. FLAVIDUS	5	612	612	453
S. PAUCISPINIS	..	..	22	..
S. PINNIGER	..	T	22	T
S. PRORIGER	..	T	22	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	T	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	5	680	678	906

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	21	22	23	24
DATE	MAY 11	MAY 11	MAY 11	MAY 11
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
START TIME (PDT)	7:30	12:53	14:26	19:24
DURATION (MIN)	22	37	29	10
START N. LAT. (DEG)	48	48	48	48
(MIN)	12.0	13.1	12.8	12.2
W. LONG (DEG)	125	125	125	125
(MIN)	16.9	14.4	14.8	16.7
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	12.2	11.9	13.0	12.4
W. LONG (DEG)	125	125	125	125
(MIN)	15.8	15.9	17.0	16.0
HAUL DISTANCE (N MI)	0.8	1.6	1.5	0.5
DIRECTION (DEG.TRUE)	80	200	200	50
BOTTOM DEPTH (M)	190- 143	154- 212	135- 115	190- 110
(FM)	104- 78	84- 116	74- 63	104- 60
NET/GEAR DEPTH (M)	110- 108	101- 148	101- 108	101- 86
(FM)	60- 59	55- 81	55- 59	55- 47
FOOTROPE-BOTTOM (M)	64- 18	117- 48	18- 0	73- 7
DISTANCE (FM)	35- 10	64- 26	10- 0	40- 4
WATER TEMP. (DEG C)	10.0	10.0	10.1	10.0
GEAR TYPE	200	200	200	200
TIDE	EBB	FLOOD	FLOOD	EBB
TOTAL CATCH (KG)	272	136	544	0
REMARKS	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	21	22	23	24
DATE	MAY 11	MAY 11	MAY 11	MAY 11
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	14	..	..
S. FLAVIDUS	272	54	381	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	68	54	..
S. PRORIGER	..	..	109	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	272	136	544	0

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	25	26	27	28
DATE	MAY 11	MAY 12	MAY 12	MAY 12
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
START TIME (PDT)	20:06	8:44	14:45	17:50
DURATION (MIN)	40	23	90	25
START N. LAT. (DEG)	48	48	48	48
(MIN)	12.1	11.6	08.2	12.6
W. LONG (DEG)	125	125	125	125
(MIN)	16.0	17.2	18.9	15.8
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	11.1	12.2	08.9	11.7
W. LONG (DEG)	125	125	125	125
(MIN)	17.1	16.5	18.0	16.1
HAUL DISTANCE (N MI)	1.2	0.8	0.9	0.9
DIRECTION (DEG.TRUE)	270	20	360	195
BOTTOM DEPTH (M)	223- 201	201- 154	159- 119	126- 126
(FM)	122- 110	110- 84	87- 65	69- 69
NET/GEAR DEPTH (M)	75- 148	112- 119	106- 84	73- 102
(FM)	41- 81	61- 65	58- 46	40- 56
FOOTROPE-BOTTOM (M) DISTANCE (FM)	91- 37	73- 18	37- 18	37- 7
	50- 20	40- 10	20- 10	20- 4
WATER TEMP. (DEG C)	10.0	-	-	-
GEAR TYPE	200	200	200	200
TIDE	EBB	EBB	FLOOD	EBB
TOTAL CATCH (KG)	453	182	0	362
REMARKS	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	25	26	27	28
DATE	MAY 11	MAY 12	MAY 12	MAY 12
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	23	5	..	54
S. FLAVIDUS	362	145	..	290
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	45	5	..	9
S. PRORIGER	23	27	..	9
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	..	..	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	..	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	453	182	0	362

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER		29	30	31	32
DATE		MAY 13	MAY 13	MAY 13	MAY 13
AREA (MAJOR, MINOR)		3C,21	3C,21	3C,21	3C,21
START TIME	(PDT)	6:42	8:53	9:59	13:58
DURATION	(MIN)	8	13	27	57
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	26.8	22.8	22.4	22.6
W. LONG	(DEG)	125	125	125	125
	(MIN)	03.2	02.4	02.6	03.0
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	26.5	23.1	23.3	24.2
W. LONG	(DEG)	125	125	125	125
	(MIN)	03.4	02.1	02.5	01.1
HAUL DISTANCE (N MI)		0.3	0.4	0.9	2.0
DIRECTION (DEG.TRUE)		190	25	25	55
BOTTOM DEPTH	(M)	179- 183	168- 181	165- 154	150- 187
	(FM)	98- 100	92- 99	90- 84	82- 102
NET/GEAR DEPTH	(M)	71- 75	115- 139	93- 119	115- 79
	(FM)	39- 41	63- 76	51- 65	63- 43
FOOTROPE-BOTTOM DISTANCE	(M)	91- 91	55- 26	55- 18	18- 91
	(FM)	50- 50	30- 14	30- 10	10- 50
WATER TEMP. (DEG C)		10.0	10.5	10.5	10.5
GEAR TYPE		200	200	200	200
TIDE		EBB	EBB	EBB	FLOOD
TOTAL CATCH	(KG)	1360	15	680	136
REMARKS		USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	29	30	31	32
DATE	MAY 13	MAY 13	MAY 13	MAY 13
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	..	15	340	82
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	34	..
S. PRORIGER	..	..	34	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	952	..	..	13
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	408	..	272	41
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	1360	15	680	136

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	33	34	35	36
DATE	MAY 13	MAY 14	MAY 14	MAY 14
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
START TIME (PDT)	16:12	11:02	16:40	20:04
DURATION (MIN)	30	48	73	69
START N. LAT. (DEG)	48	48	48	48
(MIN)	23.0	26.6	14.6	09.1
W. LONG (DEG)	125	125	125	125
(MIN)	02.1	02.4	15.9	19.9
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	21.7	25.1	14.7	08.8
W. LONG (DEG)	125	125	125	125
(MIN)	02.2	01.6	16.9	19.8
HAUL DISTANCE (N MI)	1.3	1.6	3.4	3.2
DIRECTION (DEG.TRUE)	190	125	250	325
BOTTOM DEPTH (M)	185- 201	179- 220	113- 117	128- 124
(FM)	101- 110	98- 120	62- 64	70- 68
NET/GEAR DEPTH (M)	93- 102	102- 84	79- 95	93- 93
(FM)	51- 56	56- 46	43- 52	51- 51
FOOTROPE-BOTTOM (M)	73- 82	60- 101	18- 6	18- 15
DISTANCE (FM)	40- 45	33- 55	10- 3	10- 8
WATER TEMP. (DEG C)	10.5	10.2	12.0	12.0
GEAR TYPE	200	200	200	200
TIDE	FLOOD	EBB	FLOOD	FLOOD
TOTAL CATCH (KG)	907	1133	1133	45
REMARKS	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	33	34	35	36
DATE	MAY 13	MAY 14	MAY 14	MAY 14
AREA (MAJOR, MINOR)	3C,21	3C,21	3C,21	3C,21
FLATFISH	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	46	T	..	45
S. PAUCISPINIS	..	..	T	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	1133	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	..	..	..
PACIFIC HAKE	861	113	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	..	1020	..	..
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	907	1133	1133	45

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER		37	38	39	40
DATE		MAY 15	MAY 16	MAY 16	MAY 16
AREA (MAJOR, MINOR)		3C,21	4B,20	4B,20	4B,20
START TIME	(PDT)	11:24	6:26	11:13	12:48
DURATION	(MIN)	8	70	44	54
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	27.1	33.5	32.4	30.0
W. LONG	(DEG)	125	124	124	124
	(MIN)	06.3	35.0	39.0	37.9
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	26.8	32.1	32.7	31.5
W. LONG	(DEG)	125	124	124	124
	(MIN)	06.7	36.6	41.8	35.1
HAUL DISTANCE (N MI)		0.4	2.8	1.9	2.4
DIRECTION (DEG.TRUE)		225	309	265	102
BOTTOM DEPTH	(M)	179- 155	115- 102	112- 115	123- 124
	(FM)	98- 85	63- 56	61- 63	67- 68
NET/GEAR DEPTH	(M)	108- 130	90- 77	86- 88	97- 101
	(FM)	59- 71	49- 42	47- 48	53- 55
FOOTROPE-BOTTOM	(M)	55- 9	9- 9	9- 7	9- 7
DISTANCE	(FM)	30- 5	5- 5	5- 4	5- 4
WATER TEMP. (DEG C)		13.0	10.0	-	10.0
GEAR TYPE		200	200	200	200
TIDE		EBB	EBB	EBB	EBB
TOTAL CATCH	(KG)	680	680	10	181
REMARKS		USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	37	38	39	40
DATE	MAY 15	MAY 16	MAY 16	MAY 16
AREA (MAJOR, MINOR)	3C,21	4B,20	4B,20	4B,20
FLATFISH	..	T	..	T
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	17	408	10	109
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	..	..
OTHER ROCKFISH	..	..	..	..
PACIFIC HERRING	..	..	..	..
PACIFIC COD	..	68	..	54
PACIFIC HAKE	17	..	..	..
PACIFIC SALMON	..	..	..	..
WALLEYE POLLOCK	646	204	..	18
OTHER ROUNDFISH	..	..	..	..
SPINY DOGFISH	..	..	..	..
OTHER SELACHII	..	..	..	..
TOTAL CATCH (KG)	680	680	10	181

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER		41
DATE		MAY 16
AREA (MAJOR, MINOR)		4B,20
START TIME	(PDT)	16:32
DURATION	(MIN)	43
START N. LAT.	(DEG)	48
	(MIN)	31.7
W. LONG	(DEG)	124
	(MIN)	35.5
FINISH N. LAT.	(DEG)	48
	(MIN)	31.1
W. LONG	(DEG)	124
	(MIN)	33.6
HAUL DISTANCE (N MI)		1.4
DIRECTION (DEG.TRUE)		125
BOTTOM DEPTH	(M)	113- 137
	(FM)	62- 75
NET/GEAR DEPTH	(M)	86- 102
	(FM)	48- 56
FOOTROPE-BOTTOM DISTANCE	(M)	9- 18
	(FM)	5- 10
WATER TEMP. (DEG C)		10.0
GEAR TYPE		200
TIDE		FLOOD
TOTAL CATCH	(KG)	907
REMARKS		USABLE

APPENDIX TABLE 3 (CONTINUED)

HAUL NUMBER	41
DATE	MAY 16
AREA (MAJOR, MINOR)	4B,20
FLATFISH	..
S. ENTOMELAS	..
S. FLAVIDUS	635
S. PAUCISPINIS	..
S. PINNIGER	..
S. PRORIGER	..
OTHER ROCKFISH	..
PACIFIC HERRING	..
PACIFIC COD	..
PACIFIC HAKE	..
PACIFIC SALMON	..
WALLEYE POLLOCK	272
OTHER ROUNDFISH	..
SPINY DOGFISH	..
OTHER SELACHII	..
TOTAL CATCH (KG)	907

Footnotes to Appendix Table 3

Area:	3C, 21 = Cape Flattery Spit = Ollie Spot 3C, 23 = Big Bank 4B, 20 = San Juan General area only; for specific location see Fig. 1 and 2.
Start Time:	Pacific Daylight Time.
Distance Travelled:	Expressed in nautical miles. Hauls 3, 35, 36 were circular tows and distances were therefore calculated by duration x speed.
Depth (m):	Depth at start and finish of haul, expressed in meters.
Water Temperature: (Deg. C)	Recorded at surface only, expressed in degrees Celsius.
Type of Gear:	20 = Midwater trawl (for specifications see Appendix Table 1).
Total Catch:	Expressed in kilograms. Tr = Trace (<1 kg).
Remarks:	Usable haul.

Appendix Table 4. Common and scientific names of species captured during the M/V SUN MAIDEN rockfish tagging cruise, May 3-17, 1982.

Common name	Scientific name
FLATFISH	
English sole	*Parophrys vetulus*
Flathead sole	*Hippoglossoides elassodon*
Rex sole	*Glyptocephalus zachirus*
ROUNDFISH	
Widow rockfish	*Sebastes entomelas*
Yellowtail rockfish	*Sebastes flavidus*
Bocaccio	*Sebastes paucispinis*
Canary rockfish	*Sebastes pinniger*
Redstripe rockfish	*Sebastes proriger*
Chinook salmon	*Oncorhynchus tshawytscha*
Lingcod	*Ophiodon elongatus*
Pacific cod	*Gadus macrocephalus*
Pacific hake	*Merluccius productus*
Pacific herring	*Clupea harengus pallasi*
Walleye pollock	*Theragra chalcogramma*
American shad	*Alosa sapidissima*
Whitebait smelt	*Allosmerus elongatus*
SELACHII	
Spiny dogfish	*Squalus acanthias*
Longnose skate	*Raja rhina*